ENVIRONMENTAL CONSIDERATIONS FOR PLANNING THE CONSTRUCTION OF HYDROCARBON PIPELINE FACILITIES IN THE PROVINCE OF ONTARIO

FIRST EDITION

January, 1982

Ministry of the Environment

The Honourable
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Minister

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INTRODUCTION

The intent of this Guideline is to provide direction and assistance to companies and their agents in planning the detailed design and construction of hydrocarbon pipelines and related facilities. The guideline recommends procedures that are considered to be consistent with sound environmental practice. They are also intended to inform the public of MOE's recommended policies and standards for this industry.

The Ministry of the Environment recommends that construction of all pipeline facilities be undertaken in a manner consistent with this guideline. These facilities are usually constructed under the jurisdiction of either the Ontario Energy Board or the National Energy Board. This Ministry encourages the adoption of this guideline as a matter of standard procedure and practice and as a condition of any approvals of pipelines constructed in Ontario.

If the company anticipates specific requirements of this guideline cannot be complied with or are not necessary during construction, those areas must be identified and reasons for the deviation should be stated in the Environmental Report. In cases where an emergency situation develops which requires a deviation, the information shall be filed immediately after the fact with the appropriate jurisdictional authorities and known interested parties.

The spirit and intent of the appropriate sections of this guideline will be reflected within the specifications and drawings for such projects and that the intent of the sections will be achieved in the field during construction.

Some of the items in this guideline may have to be expanded upon or changed for a specific project. Guidance for such change is available from:

The Director,
Environmental Approvals Branch,
Ministry of the Environment,
135 St. Clair Avenue West,
Toronto, Ontario.
M4V 1P5

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1.0 COMMUNICATIONS AND INFORMATION TO "LANDOWNERS"

1.1 The proponent is responsible to prepare a list including names, addresses and telephone numbers of "Landowners" which includes owners, tenants and any others who have proprietory rights in any affected lands.

1.2 The Company or their agent shall prepare and make available to any of those government authorities who require this information, the following:

1.2.1 an identification of the method(s) and form(s) of notification to be used.

1.2.2 Identify the times (in advance of) and the stages of the project plans (i.e., ROW survey, property negotiation, construction, restoration and cleanup, operational activities to which these notification procedures will apply. One such notification to landowners shall include a written 15-day (minimum) advance notice of the start of any construction activities. This notice is to include the proposed schedule of the timing and location of construction activities. It shall also include names, addresses and telephone numbers of representatives for the company, the contractor, and the appropriate jurisdictional authority. The municipality or their agent shall consider providing with this notice the copy of plans discussed in item (1.2.3.) below.

1.2.3 Plans and instructions that apply to individual properties shall be developed

through appropriate consultation, negotiation and development of mutually acceptable agreements with those identified as having rights. These plans shall be attached to or become part of the supplementary contract specifications and drawings. The parties identified as having rights shall be provided with copies of these documents and agreements as they apply to their property well in advance of construction.

1.2.4 The plans referred to in (section 1.2.3) above shall include as a minimum items concerning those areas of this document that refer to landowners as they are applicable to the property in question. All of these agreements and plans shall be considered public and be made available to anyone requesting them.

1.2.5 Landowner compensation measures shall be established prior to any construction that affects the property.

2.0 WORKING AREA DELINEATION

Before construction activity commences:

2.1 The boundaries of the working area shall be delineated through the use of stakes, snow fencing, or hoarding, as appropriate.

2.2 Snow fencing shall be placed between construction easement and all watercourses, marshes, trees, shrubs and sensitive areas, to protect those areas and items

from construction activities, excavations and equipment. The areas refered to might include: environmentally sensitive areas; livestock grazing areas; and areas were public safety is of concern. The items referred to would specifically include trees and shrubs. Trees and shrubs are to have snow-fence installed at the 'drip-line' or greater distance from the trunks.

3.0 CONSTRUCTION WORKYARDS AND ACCESS ROUTES

Temporary and permanent workyards may be required to serve as sites for storage of material and equipment, maintenance and miscellaneous work operations, employee parking and field administration centre.

3.1 The amount of land cleared to establish a construction yard or access route(s) should be kept to the minimum area necessary. Workyards should be as close as possible to main roads for delivery of materials and equipment. Both workyards and access roads should be located and designed in consideration of land usage expected. Treatment required to mitigate environmental damage must be listed for the contractor. All of this work should be completed to the satisfaction of the landowner. Section 9.0 is also applicable to the construction of workyards and access routes.

3.2 An adequate access route must be available to cross the right-of-way and easement or temporary work area during all phases of construction so as not to inhibit normal movement of equipment or animals in an agricultural setting or people and vehicles in an urban setting. Any open trench or excavation shall

be fenced away to prevent ready access by the public, livestock and other domestic animals.

3.3 For safety purposes, public access to the construction yard should be restricted. This may require a barrier or a gate with a lock if necessary at the entrance. As well as being a safety precaution, this may discourage vandalism of equipment.

3.4 The site should not create a severe distraction in the neighbourhood. Where possible it should be located making use of natural screens such as trees or a hill. The erection of construction hoarding may be necessary to minimize visual and audio impact.

3.5 The site should not constitute a traffic hazard created by incoming and outgoing vehicles. Approaches to intersections of access roads to construction sites should be selected and identified to warn traffic of slow moving equipment which may be turning on or off main roads. Access roads should be designed to accommodate anticipated loads and the types of vehicles which are necessary for construction activities, including temporary bridges.

4.0 EQUIPMENT FUELING, MAINTENANCE AND STORAGE

4.1 Equipment fueling and maintenace and storage shall be done in such a manner that no fuels, oils, chemicals and other toxic materials can gain access to surface or ground water.

The contractor shall undertake a detailed review of his proposed route of construction to plan access routes and fuelling areas. Fuel storage, refuelling

and maintenance of equipment shall not be undertaken in or adjacent to watercourses. Suitable fuelling and maintenance areas shall be established and all maintenance and fuelling conducted in these areas. The locations of such areas are subject to approval by the Project Engineer and Environmental Inspector. Procedures for the interception and rapid clean-up and disposal of spillages that do occur shall be submitted to the Engineer and Environmental Inspector for review and approval prior to sta[illegible] work. Materials required for cleanup of fuel [illegible] shall be maintained in a readily usable state, on site and shall be capable of handling the maximum volume of liquid which is likely to be spilt.

The exception to this fuelling location requirement shall be generators, cranes, backhoes or shovels which may be fuelled at other than the designated fuelling areas. However, no fuelling of backhoes shall be carried out within thirty metres of any watercourse. This requirement may be relaxed at the discretion of the Engineer and Environmental Inspector if acceptable non spill, fuelling facilities are used.

4.2 There shall be a plan and the means available for the containment and rapid clean-up and disposal of spillages (land and/or water) that do occur. Any spills that could cause impairment to the natural environment must be reported by the Engineer and Environmental Inspector and to the local MOE District Office immediately.

4.3 Small amounts of residual and waste from normal vehicle servicing and maintenance may be disposed of

at an approved waste disposal site with the permission of the site owner. Large amounts of waste or excess oil or fuel requires consultation with MOE and shall either be brought to a collection system saved for future use or returned to the supplier. Wherever disposal of toxic wastes is contemplated, the local MOE District Office shall be contacted immediately.

4.4 The cleaning of equipment in streams and lakes and the emptying of fuel, lubricants and pesticides into watercourses is prohibited. Construction equipment shall be cleaned prior to entering public roadways to minimize the tracking of mud and creation of dust. Protection or repair shall be provided to public road surfaces from any construction equipment utilizing those facilities. All equipment and materials shall be stored in an orderly manner and in locations acceptable to the Ministry.

4.5 Exhaust emissions from equipment shall be minimized chrough effective machine maintenance.

5.0 DUST AND PARTICULATE CONTROL

5.1 Dust control measures shall be undertaken to prevent dust nuisances resulting from any phase of construction operation.

Permitted dust control measures may include the application of calcium chloride, oil or water. In general, the use of calcium chloride and oil shall be minimized and restricted to vehicular rights-of-way. In close proximity to watercourses and land to be

used for agriculture, water applications only should be used. (See also section 11.6).

5.2 In extreme cases, dust may become more of a hazard than a nuisance. On roads for instance, dust may affect visibility and constitute a safety hazard. Similarly, without dust protection, prolonged exposure to dust from drilling operations may constitute a health hazard. While dust control measures may eliminate or reduce such potential hazards some dust control agents may themselves create problems if improperly applied.

Oil should not be used as a dust control agent where oil content contains amounts of other toxic materials such as PCBs beyond established guidelines.

Water should not be applied in amounts large enough to cause erosion from runoff.

Wood chips or gravel may be useful and a lasting solution to dust problems in small, heavy use areas such as turnouts and truck loading, and dumping areas.

5.3 Dusty materials shall be transported in covered haulage vehicles. (See the Highway Traffic Act, s.12, Reg. 12).

6.0 NOISE CONTROL

6.1 The provisions of the document: "Noise Control Guidelines for the Construction of Hydrocarbon Pipeline Facilities", MOE Publication, January, 1982, shall be recognized and adhered to, (see Appendix A).

6.2 Noise levels shall be controlled in accordance with local by-laws, including by-laws derived using the "Model Municipal Noise Control By-law", MOE Publication, August, 1978.

6.3 All vehicles and equipment shall be equipped with effective muffling devices and shall be operated in a fashion to minimize noise levels in the project area.

6.4 As identified in the 'Noise Control Guideline', noise attenuation devices (barriers) shall be placed around pumps, compressors and pile-drivers and other stationary sources of loud noise.

7.0 DRILLING AND BLASTING

The various environmental impacts associated with drilling and blasting operations include noise and air pollution as well as land disfiguration.

7.1 When drilling and blasting operations are carried out in the vicinity of populated areas, these activities shall be carried out during normal working hours, (e.g. 0700 and 2000 hours of weekdays). When it is necessary that such activities be undertaken outside normal working hours and over extended periods of time, any adjacent local residents potentially affected are to be given prior notice. These provisions should apply as well to other noise producing activities, such as hydrostatic tests.

7.2 Drilling and blasting operations shall be scheduled to avoid endangering wildlife.

7.3 Drilling and blasting operations must adhere to the appropriate provisions of the above referenced noise control publications (see Appendix A).

7.4 Dust control measures shall be instituted to minimize air pollution.

7.5 Blasting shall be undertaken in such a manner as to minimize the effects on local wells and streamflow. Whenever possible, water wells and quality in wells within 300 m from the proposed blasting should be monitored prior to blasting.

8.0 PROTECTION OF LAND FEATURES AND VEGETATION

Land features to be considered include: land forms, (berms), trees, shrubs and ground cover which might be affected by construction activities. The Engineer and/or Environmental Inspector in consultation with affected landowners must designate these features. These features are to be designed either: to be protected in situ; to be removed and transplanted or replaced; or to be removed and replaced unless otherwise determined through negotiation with the landowner.

Techniques for achieving these results shall appear on or attached to the construction specifications and drawings.

The following procedures shall be followed:

8.1 For vegetation to be protected in situ:

- Erect snow fencing around drip line of trees within working area.

- Do not stockpile material within drip line.
- Do not allow traffic, vehicles or equipment to compact soil within drip line.
- Prune interfering branches and treat with approved dressing.
- Do not cut tree roots.
- Tunnel under or around roots by hand digging without damaging roots.
- Treat all damaged roots over 25 mm in diameter immediately with approved tree paint.

8.2 When Raising grades in vicinty of vegetation to be protected:

- When fill is less than 400 mm deep, place clean washed gravel around tree trunk to a minimum radius of 450 mm and approximately 50 mm above finished grade.
- Use gravel graded 25 mm to 50 mm in size.
- Place gravel before earth fill.
- Do not leave earth fill in contact with trunks.
- When fill is more than 400 mm deep, depending upon the circumstances, the vegetation could be removed and replanted to match finished grade, a well could be formed around the trunk using steel, wood, brick or stone retaining structures, and/or a watering/ feeding/-ventilaton system could be established during filling operations utilizing tiles.

8.3 When lowering grades in vicinity of vegetation to be protected:

- Provide broad rounded mounds for trees to be preserved and located above finished grade.
- The amount of cutting within drip line should be minimized. This may involve leaving irregularly shaped mounds.

- Cut all exposed or broken roots greater than 25 mm diameter clean, treat with approved dressing and cover with top soil.

8.4 For vegetation to be transplanted:

- When possible root and foliage pruning shall take place well in advance of transplanting in order to prepare the plant.
- The ratio of the diameter of the earth ball to be dug out to the calibre of the trunk of the tree at breast height shall be a minimum of 12 to 1.

9.0 CLEARING RIGHTS-OF-WAY/DISPOSAL OF EXCESS MATERIAL

9.1 Grubbing and topsoil stripping shall not be permitted on any slopes or soils were soils may be sensitive to erosion (especially where these slopes are adjacent to watercourses) more than two days in advance of trench excavation (see also 10.2 to 13.5).

9.2 Top soil shall be stripped in the manner and extent indicated by the Environmental Report and the Landowner and shall be stockpiled so that it may be replaced following construction. Topsoil is to be kept separated from subsoil. Excess excavated material, stones, construction debris, cleared vegetation, must be disposed of in a manner acceptable to the Landowner, Engineer and Environmental Inspector. These plans should be circulated to the Ministry of Agriculture and Food for approval.

Stockpiled material must be located away from watercourses and must be stabilized to prevent erosion. Where such measures are necessary and siltation of watercourses is possible, straw bale containment devices or alternate effective measures such as plastic sheets to cover stockpiles shall be installed.

9.3 All cleared, grubbed and excavated material shall be disposed of according to the manner described in the following sections. At no time shall excess fill be disposed of in floodplain areas without the permission of the local Conservation Authority and/or Ministry of Natural Resources. Excess fill shall not be deposited in watercourses, or around the base of trees (to remain in situ). Materials excavated from watercourse beds must be removed and disposed of in a fashion that will ensure minimum possible siltation to the watercourse.

9.4 Wherever possible arrangements shall be made with the landowner or the municipality for disposal of surplus excavated materials. Arrangements for other disposal sites shall be made if the municipality cannot make use of surplus excavated materials.

9.5 The contractor must obtain from the Engineer and Environmental Inspector a written approval for all disposal sites and methods of disposal proposed. In addition, the contractor must obtain from the landowner(s) of areas to be used for disposal, a written agreement setting out terms, conditions and ultimate responsibility for materials and location(s) to be dumped.

9.6 The contractor shall arrange with the engineer to have a Regional Environmental Officer of the Ministry of the Environment do an inspection of the disposal site prior to and after dumping operations are completed.

9.7 Disposal sites must be kept stable and materials dumped in a manner not to cause nuisance, injury, or inconvenience.

10.0 SITE DRAINAGE AND EROSION CONTROL

10.1 Site grading or other measures shall be taken to prevent runoff water from draining into the pipe trench.

10.2 The extent of removal of vegetation from slopes and near watercourses shall be minimized. Ten meter (minimum) vegetation strips shall be maintained between the construction easement and the watercourse until trenching and pipe laying is iminent. This area is to be extended to the tops of any adjacent flood plain slopes where there is a potential for erosion of soils to an adjacent watercourse (see also 9.2 and 13.5). These areas are to be designated on the contract drawings.

10.3 Provision shall be made to intercept and divert site drainage, at short distance intervals, into natural channels, infiltration ditches, settling ponds or areas of suitable and stable ground cover. These drainage structures are to be designed to accommodate the runoff expected.

10.4 Appropriate sedimentation retention measures shall be incorporated into the work to ensure that sediment discharged to watercourses or adjacent to the working area is minimized. These plans should be discussed with local offices of the Ministry of the Environment and Natural Resources and included in the contract specifications and drawings.

11.0 DEWATERING

Dewatering is the removal of impounded or ground water from the construction area. As a result of exposure to various soils and construction materials, such impounded

water may have high concentrations of suspended sediment or may be contaminated with high nutrient content and/or toxic substances. If toxic substances are involved the Ministry of the Environment should be contacted and provided with information on the contaminants, concentrations, and the proposed method of handling these materials. To prevent such water from affecting the water quality of adjacent watercourses, the following techniques are to be used:

11.1 Dewatering may be accomplished by installing sand points and intermittant or continuous pumping. In certain cases this method may be preferrable to pumping turbid wastes from trenches or other impoundments during construction.

11.2 Whenever possible suspended solids shall be allowed to settle prior to such water being pumped out of an impoundment. Settled solids (silt) may be removed, if necessary, after water has been pumped out.

11.3 If time does not allow for suitable settling of turbid waters within the impoundment, water shall pass through a sediment barrier. For small scale operations, this can be achieved by pumping the water onto a suitable, stable ground cover area and allowing for filtration of sediment through the ground cover. Berms of straw bales or other suitable materials may be used to slow runoff and encourage infiltration. These forms of sediment barriers must be checked periodically and replaced when they become saturated with silt. Larger scale operations may require special designs.

11.4 When continuous pumping of turbid waters is undertaken, it may be necessary to construct a sediment basin through which the water can be passed. A splash pad where the pumped water is discharged will assist in reducing surface erosion.

11.5 Discharge of dewatering operations to existing storm sewer works shall only be allowed if the discharge meets the requirements of the Municipal Sewer Use By-Law.

11.6 If the water removed during a dewatering operation is greater than 50,000 litres per day from any ground water source, a water taking permit, issued under the Ontario Water Resources Act, must be obtained from the Regional Office of the Ministry of the Environment. Information should be supplied with that application which documents the possible impacts associated with the water taking and discharge. This information should also indicate location(s) of water taking and discharge and proposed mitigation measures. Conditions are usually applied to these permits where granted.

12.0 GROUNDWATER AND WELLS

12.1 A water level and water quality survey of wells in the zone of influence of trenching operations should be carried out prior to construction. The adequacy of existing wells shall be established prior to commencing construction. Observation wells for recording changes in quantity/quality may be established using existing wells or drilling new shafts where potential problems could arise.

12.2 A plan for compensation (i.e., immediate delivery of water) shall be worked out prior to commencement of construction to minimize inconvenience should it be necessary to provide water for the "landowner".

12.3 Landowners' wells and water supplies that are affected by construction practices (i.e., dewatering opera-

tions and/or contamination of groundwater) shall be compensated accordingly. Landowners experiencing temporary interference shall have water made available to them until groundwater conditions return to normal or service is reinstated. Landowners experiencing permanent interference shall have their water wells or supply services restored (e.g., new well or extention of municipal service).

13.0 WATERCOURSE CROSSINGS AND CONSTRUCTION THROUGH SENSITIVE AREAS

Detailed contract specifications and drawings for each water crossing and other sensitive areas must be prepared as part of the general specifications and drawings. The site specific specifications and drawings for each area identified must be prepared for submission, review and written approval by the Ministries of the Environment, Natural Resources, and the Local Conservation Authority thirty (30) days in advance of any construction. Other parties may be included as required.

The following guidelines are to be incorporated into the above referenced specifications and drawings where applicable.

13.1 The designated contact person (to be supplied) at the nearest offices of the Ministries of Natural Resources, Environment and the Local Conservation Authority shall be provided with the following notification and information:

13.1.1 The date that construction is to be initiated.

13.1.2 A written schedule (timing and location) of proposed construction activities.

1.1.3 A weekly report of progress of construction activities only if requested.

13.1.4 Notice two (2) days prior to initiation of work in watercourses and other sensitive areas identified by the above referenced agencies.

Work in and immediately adjacent to watercourses and other sensitive areas must be designed and scheduled to ensure environmental protection.

13.2 Before any construction at a watercourse crossing begins, all equipment and materials to be used must be on site and ready for placement. Immediately prior to commencement of any construction in the watercourse, the Ontario Weather Centre or local weather office should be contacted for a five day weather forecast for rainfall. The construction should not proceed if there is a high chance of precipitation. The time from excavation to restoration shall be kept to a minimum. Maximum construction times from stream crossing, bank and floodplain slopes, from initiation through the completion of final restoration, shall be specified in the contract specifications. (These construction times are to be broken down to indicate actual in-stream work versus that work involving restoration of bank and flood plain areas.)

13.3 The number of points at which vehicles and heavy equipment will cross the river shall be identified in the specifications. (Vehicle crossing restrictions shall be stated to the extent possible.) At no time shall the streambed be used as a vehicle or equipment route, except for those crossings specified. Crossings permitted shall be as perpendicular to the river as possible to minimize in-stream distances.

Vehicles may ford streams if water levels are low enough, and if the streambanks and beds are composed of erosion resistant material. The use of wooden, rubber or gabion mats is encouraged to protect the flood plain and streambanks. No fording of watercourses shall be allowed if the working approaches to the fording areas are prone to erosion, or if unacceptable - stream muddying will result. Transport of equipment around watercourse via local roads should be considered as an alternative to the construction of new access crossings.

13.4 Bridging or fording installations for temporary stream crossings shall be made on existing natural grade with minimum possible disturbance to the channel.

13.5 The removal of vegetation from the ROW shall be kept to the minimum width necessary for construction. This will apply most particularly to steep slopes and approaches to water courses and road crossings (see also points 9.2 and 10.2).

13.6 Aquatic weeds uprooted or cut, prior to or during trenching operations must be contained and adequately disposed of on land in a manner and location acceptable to the Engineer and Environmental Inspector.

13.7 If a diversion channel is required, it shall be suitably sized and stabilized before the stream is diverted. Potential erosion sites in any emergency spillways, drainage or diversion channels shall be protected with rip rap, sand bags or other resistent material.

A water taking permit is required prior to the construction of a stream diversion channel or temporary coffer dam for purposes of water storage, (see 11.6). The permit requires that adequate downstream flow be maintained at all times to ensure the satisfactory continuation of downstream water uses, and to ensure the preservation of plant and animal life in the stream channel.

13.8 Temporary coffer dams and diversion channels should be designed to withstand any short-term or seasonal floods. The necessary equipment and material should be readily available for remedial work to any dams in the event of an emergency situation. Stable material such as coarse gravel, broken rock and sand bags is preferred over loose sands, loams and organic soils in the construction of such dams. Erodable materials on the sides of the coffer dams must be protected against current action with rip rap, sand bags or other protective material.

13.9 Prior to preparation of the contract documents, an analysis of the characteristics of flood plain and stream bed soils and parent material (to the maximum expected depth of trench) shall be undertaken. The purpose of this analysis is to allow:

(a) predetermination of acceptable construction techniques to be employed;

(b) predetermination of acceptability of the spoil materials for backfill. This analysis shall include:

- spoil material types and volumes (clay, silt, etc.)

- particle size and volumes

- contaminants, such as PCB, mercury, high nutrient content, etc.

Excavated material from the bed of the watercourses not suitable for backfilling the trench (i.e., will not cause harmful suspended sediments), shall be removed and deposited on land where it will not regain access to the watercourse. Disposal locations and methods shall be identified in the contract specifications and drawings. The runoff from such spoil shall not be allowed to re-enter the surface waters. Ditches or berms may be constructed to prevent such runoff. Locations where use of this technique is not possible must be identified and acceptable alternative strategies identified.

13.10 Cutoff walls or subsurface berms shall be used to prevent the creation of an artificial drain effect in the trench (piping).

13.11 Clean fill (dependent on analysis required in 13.9) must be used to cover the pipe as soon as it is laid across the watercourse. Streambanks and beds that have been disturbed during construction must be stabilized immediately after construction to prevent erosion. In the event a 'by-pass' or 'dry' construction technique is used beds and banks of streams shall be reinstated and stabilized prior to removal of temporary installations.

14.0 HYDROSTATIC TESTING

For the purposes of hydrostatic pressure testing of sections of newly-constructed pipeline, the taking of water from surface or ground sources in excess of 50,000 litres in a day must be authorized via water taking permits. Applications are available through the respective Regional Office of the Ministry of the Environment, and must be submitted at least six weeks in advance of any hydrostatic test.

14.1 The terms and conditions of a permit require that the filling of the pipeline from surface sources be carried out in such a manner that streamflow is not stopped or reduced to a rate that will interfere with downstream uses or with the natural functions of the stream. For proposed takings from sources in low-flow stages, the issuance of a permit may be refused until a period of higher flow, or the proposed rate of taking may be proportionally reduced, as required.

14.2 The discharge of water from a pipeline section should conform to the following:

a) The discharge water should be returned to the watercourse from which the water was drawn at a rate not exceeding the rate of withdrawal.

b) The linear velocity of discharge should not produce scouring of the stream channel or lake bed. A splash pad installed at the discharge will help to prevent erosion.

c) The quality of the water returned to the watercourse or lake should be substantially the same as the water withdrawn.

d) Pumps and/or heaters should not be located directly adjacent to a watercourse. In addition, pumps and heating equipment should be enclosed as follows:

i) two layers of 6 mm polyethylene or polyurethane film should be placed on the ground before the units are placed in position. The film should then be covered with a layer of sawdust or similar absorbent material;

ii) the edges of the sheets should be raised approximately two feet over a sand or similar embankment to collect spills of fuels, oils, etc., which would otherwise soak into the soil or runoff into a watercourse.

15.0 SITE RESTORATION

15.1 A restoration plan shall be established in consultation with potentially affected landowners prior to initiation of construction and shall be documented on the contract specifications and drawings.

15.2 Restoration shall immediately follow construction. When weather does not permit full restoration, interim stabilization shall be carried out until full restoration is possible. The maximum duration of construction activities and details for all

interim and final restoration shall be stated in the contract specifications and drawings.

15.3 All landscape features damaged during construction or designated to be replaced shall be restored to the site approximating as nearly as possible the original situation, (e.g., replacement vegetation should be of the same species, size and shape). Where it would be impractical to attempt to duplicate previous situations, (e.g., to attempt to replace large mature trees), the purpose that the original feature served should be understood, (e.g., aesthetic value, windbreak, etc.) and the replacement material should be selected to fulfill that purpose. For example, replace a large mature tree with an attractive grouping of smaller trees that will not obstruct access for repair, if necessary.

15.4 It is essential to repair and/or replace tile drainage systems to their original condition. All open drains and ditches must be properly repaired utilizing appropriate soil stabilization procedures. The extent of damage to field tiles, is closely related to ground conditions and the movements of heavy machinery. Discussions with appropriate parties having rights shall be entered into as early as possible so that the extent and location of tile beds can be determined. Steel plates may be used to bridge tiles. Where tiles are known to be broken or are suspected of being broken, the tiles should be inspected and repaired as required. In some cases, tile damage is not apparent for several years. The matter of tile repair should be discussed in detail with the landowner and shall be carried out by a licenced tile drainage contractor.

Tile drains that are cut during the trenching operation shall be bulkheaded with a permeable material to prevent the entrance of debris and silt into the drainage system, and to accommodate the free flow of water through the system. Construction crews should consider carrying spare tiles so that interim by-passes may be created.

16.0 PROJECT MONITORING AND INSPECTION

16.1 PURPOSE FOR MONITORING AND INSPECTION PROGRAMS

Monitoring and inspection provides an accounting mechanism for companies consultants, contractors, government agencies and the public to learn from successes and failures associated with the implementation of a project.

A good monitoring and inspection program promotes continued improvements in project planning, construction and operation. This decreases the incidents of environmental damage, avoids contentious issues, possible prosecutions and can lower project and administrative costs. It also has the beneficial effect of increasing the credibility of the project proponent.

Monitoring and inspection ensures that there is a direct feedback from what is actually experienced in the field to what was predicted in a project's planning phase. Thus, the Environmental Study impact predictions can continually be re-evaluated and improved from project to project. Also, unexpected impacts that occur during a project's implementation can be identified and immediate action taken to mitigate negative effects.

The examination of impacts in a more scientific and quantifiable fashion can lead to better knowledge and decision-making concerning the level or extent of mitigation necessary to ameliorate negative environmental impacts and enhance the benefits associated with an undertaking.

16.2 MONITORING AND INSPECTION PROGRAM DESIGN

The Environmental Study Report(s) (ESR) will provide an accurate depiction of conditions which exist prior to the implementation of the undertaking. The anticipated effects of construction and operation of the undertaking and the proposed actions to mitigate those effects will have been predicted.

It is expected that a monitoring and inspection program will be developed for each project undertaken. For small projects the effort can be minimized, but must none-the-less be done. It may not be necessary to hire an Environmental Inspector for small projects that have little or no environmental impacts predicted. However, his responsibilities as outlined throughout this guideline are expected to be delegated and carried out in the field.

Each ESR will outline a program which will monitor the key impacts expected to be associated with a project's implementation. The monitoring and inspection program will describe the environmental impacts that occur both during and after construction and during the operation and retirement of the project. It shall also examine the successes and failures of the measures selected to avoid or mitigate the predicted adverse environmental effects of the undertaking during all phases of construction, operation and retirement. As such, monitoring and inspection should be an on-going activity practiced throughout all stages of a project's implementation such as: construction, operation and retirement.

The company or their agent is responsible to design and document in the ESR a program that satisfies in addition to those items referenced above, the following:

a) a definition of the objectives of the monitoring and inspection program;

b) a clear indication of the key impacts predicted that will be monitored;

c) a determination of the information required to evaluate the cause and effects of each impact to be monitored. This shall include, but not be limited to, the frequency and timing of surveys, location of monitoring sites or areas, methods of data collection, analysis and evaluation;

d) a clear indication of the need for inspectors, (i.e., number(s) of staff, qualifications, etc). Also their expected duties, reporting requirements and procedures. The inspectors' powers and responsibilities are to be outlined.

e) the expected monitoring report production format and scheduled date(s) of filing shall be identified in the ESR.

16.3 MONITORING PROGRAM REPORT REQUIREMENTS

Monitoring documentation shall be produced which reports on the above referenced requirements. This monitoring documentation shall draw conclusions and make recommendations.

It may be necessary or desirable to submit monitoring documentation during the construction phase, after the construction phase or after the operation of the under-

taking has commenced. This documentation may be in the form of a report(s) or letter(s). It is not anticipated that documentation will necessarily be required at each of the three stages referenced above. For example, the documentation could consist of a reporting letter filed at the completion of the construction stage for a relatively simple project. For those projects which have a greater significance, it is expected that more comprehensive and frequent documentation would be required.

All monitoring documentation shall be filed with appropriate jurisdictional authorities, interested ministries and agencies of the Province and be readily available to the public.

APPENDIX A

NOISE CONTROL GUIDELINE FOR THE CONSTRUCTION OF HYDROCARBON PIPELINE FACILITIES

1. CONSTRUCTION PHASE OF PROPOSED FACILITIES

(i) The construction work shall be restricted to normal day shift, e.g., 07:00 h to 20:00 h on weekdays only.

Should the scheduling of work need clearly audible operation beyond this time limit, the contractor shall require special permission from the approving authority.

(ii) Construction equipment used on the job site adjacent to residential areas shall comply, where applicable, with the sound emission standards set out in the following tables:

Residential Area Sound Emission Standards for Excavation Equipment, Dozers, Loaders, Backhoes or Other Equipment Capable of Being Used for Similar Application

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Maximum Sound Level as Determined Using SAE J88a Testing Procedure

	dBA	
	Power Rating	Power Rating
Date of Manufacture	Less than 75 kW	75 kW and Larger
January 1, 1979 to December 31, 1980	85	88
January 1, 1981 and after	83	85

Sound Emission Standards for Pneumatic Pavement Breakers

Standard	Date of Manufacture	Maximum Sound Level as Measured Using MEMAC Test Code dBA
Residential Area Sound Emission Standards	January 1, 1979 to December 31, 1980	90
Residential Area Sound Emission Standards	January 1, 1981 and after	85

Sound Emission Standards for Portable Air Compressors

Standard	Date of Manufacture	Maximum Sound Level as Measured Using MEMAC Test Code dBA
Residential Area Sound Emission Standard	January 1, 1979 and after	76
Residential Area Sound Emission Standard	January 1, 1981 and after	100

(iii) For compressors and pumps operated beyond normal working hours for the purpose of site maintenance, the sound expressed in terms of the one hour equivalent sound level (L_eq) shall not exceed the one hour equivalent sound level (L_eq) caused by road traffic in the area, for a residential point of reception and for the same time.

(iv) Where blasting operation is required (or planned), airblast noise (concussion) and vibration levels shall not exceed the following limits at a residential point of reception:

(a) The peak pressure level limit for concussion resulting from blasting operation is 120 dB.

(b) The peak particle velocity limit for vibration resulting from blasting operation is 1.00 cm/s.

(v) The routes used for truck traffic related to the construction shall be selected according to best traffic pattern by the approving authority and the municipality. Truck traffic shall not be directed through quiet zone or residential area unless with municipal permission. Truck traffic to the construction site shall be restricted to the working hours stated in Sec. 1(i). Emergency and maintenance crews and their vehicles are exempted from the requirements of Sec. 1(i) and 1(v).

(vi) A heavy vehicle (i.e. customized conveyances licensed for road use and powered by a governed diesel engine) used in the construction shall not emit sound level higher than 95 dB when measured in accordance with the procedure set out in CSA Standard; CSA Z107 22-M1977.

2. OPERATIONAL NOISE EMISSION OF PROPOSED FACILITIES

(i) Sound levels resulting from the facility operation shall not exceed the following limits:

(a) For impulsive sounds, other than Quasi-Steady Impulsive Sound, if the sound level is measured in terms of the Logarithmic Mean Impulse Sound Level (L_LM), expressed as:

where, $dBAI_1$, $dBAI_2$, ...$dBAI_N$, are the N impulse sound levels.

the applicable sound level limit is the one hour equivalent sound level (L_eq) caused by road traffic in the area, for a residential point of reception and for the same time.

(b) For other sounds, including Quasi-Steady Impulsive Sound, if the sound level is expressed in terms of the one hour equivalent sound level (L_eq), the applicable sound level limit is the one hour equivalent sound level (L_eq) caused by road traffic in the area, for a residential point of reception and for the same time.

(ii) Where operation of equipment in the facility is expected to result in sound levels in excess of the limits stated in Sec. 2(i) (a) (b), introduction of noise abatement measures is mandatory to achieve compliance with the limits. The abatement measures may include, but are not limited to, the following:

(a) Distance separation between facility and adjacent noise sensitive uses;

(b) Favourable topographical features: berms, barriers or other intervening structures;

(c) Enclosures, screens, silencers, mufflers, lagging treatment or vibration isolators;

(d) Acoustical treatment applied to structural components of the facility;

(e) Modifications to the process in the facility.

3. PROTECTION OF WILDLIFE HABITAT

Where the operation of pumping or compressor stations, construction equipment and trucks is likely to disturb wildlife in its natural habitat consideration should be given to the control of noise that is capable of:

- Masking wildlife signals (calls);
- Interfering with nesting and reproduction;
- Interfering with the use of the natural range and traditional feeding grounds.

REFERENCES

1) "Effects of Noise and Wildlife and Other Animals", EPA 550/9.80, July 1980, Washington D.C.

2) "Northern Frontier, Northern Homeland", Volume 2 of Justice T.R. Berger Report, Supply and Services Canada, 1977, Ottawa.

3) "Effects of Noise on Wildlife", Fletcher & Busnel, Academic Press, 1978.

APPENDIX B.1

TELEPHONE NUMBERS OF MOE REGIONAL AND DISTRICT OFFICES

Northwestern Region	
Thunder Bay District Office	475-1205
Kenora District Office	
Northeastern Region	
Sudbury District Office	675-4501
Timmins District Office	264-9474
Sault Ste. Marie District Office	949-4640
North Bay District Office	476-1001
Parry Sound District Office	746-2139
Southwestern Region	
London Regional Office	681-3600
Windsor District Office	945-2339
Sarnia District Office	336-4030
Owen Sound District Office	371-2901
Chatham Sub-District Office	352-5107
Clinton-District Pesticides Ofcr.	482-3428
West-Central Region	
Hamilton Regional Office	521-7640
Cambridge District Office	623-2080
Welland District Office	735-0431
Central Region	
Barrie District Office	762-1730
Muskoka-Haliburton District Office (Gravenhurst)	687-3408
Peterborough District Office	743-2972
Toronto District Office	424-3000
Halton-Peel District Office (Oakville)	822-2566
Huntsville Sub-Office	789-2386
Southeastern Region	
Kingston Regional Office	549-4000
Ottawa District Office	521-3450
Cornwall District Office	933-7402
Belleville District Office	962-9208
Pembroke District Office	732-3643

APPENDIX B.2

Tel. Nos. of Ontario Weather Offices*	Hours of Operation		Hub Respons.**
Toronto 676-4567 676-3020	24-hr. Operation (weather for all Ontario)		
Hamilton (T. Dwyer) 524-2035	Mon-Sat Sun OIC (Admin)	0545-2105 LST 0645-2205 0800-1530	Toronto
Kingston (G. Hasler) 613-389-3252	Mon-Sun	0545-2045 LST	Ottawa
London 451-4750	Mon-Sun	0545-2240 LST	Windsor
St. Catharines (R. King) 688-1847	Mon-Sun	0645-1715 LST	Toronto
North Bay (D. Code) 705-472-9110	24-hr operation		-
Ottawa (M. Forbes) 185-8-9443 613-521-0850	24-hr operation		-
Peterboro (R. Laroque) 519-542-6051	Mon-Sun	0630-1713 LST	Ottawa
Sarnia (G. Garner) 519-542-6051	Mon-Sun	0545-1630 LST	Windsor
S. Ste Marie (R. Houghton) 705-779-3144	Mon-Sun	0630-2115 LST	North Bay
Sudbury (J. DeCorby) 705-693-4540	Mon-Sun	0545-2130 LST	Toronto
Waterloo/Well (J. Millar) 648-2571 648-2833	Mon-Fri Mon-Sun	0630-1400 LST 0630-1710 LST	Toronto (1PY)*** (2PY)***
Windsor (J. Mornan) 519-969-1792	24-hr operation		

* These are called WO 4 weather offices which provide briefing services and provision of documentation using weather forecasts from WO 1 levels. WO 1 levels provide the forecasts.

** During the quiet (or off) hours issuance of weather warnings would be taken over by the offices listed.

*** Persons on duty.

APPENDIX C

DETAILS TO BE SHOWN ON ALL CONTRACT DRAWINGS PREPARED FOR MINISTRY OF THE ENVIRONMENT PROJECTS

The details which should be shown on all contract drawings are:

1. Plan and profile views with surface contours at intervals not greater than 5 feet or 2 meters (where possible).

2. All watercourses (permanent and intermittent) as well as major surface drainage courses.

3. In all urban situations and also in rural residential situations, all trees, shrubs and landscape features within, as well as immediately adjacent to the working area. The company or their agent should indicate the vegetation that is to be removed, as well as that which is to be saved, so that there will be no confusion in the field.

   In non-urban situations where more extensive forested areas exist and it is not practicable to identify each specific item of vegetation, general listings will be acceptable. However, special items or areas to be saved should be clearly identified. In all cases sensitive or unique areas (Landscapes, Flora or Fauna) are to be clearly identified .

4. All existing and planned (where known) utilities, occupied and vacant buildings and other structures.

5. The alignment of the pipeline and related facilities including boundaries of permanent and temporary easements, access roads and bridges; and construction yards are to be identified.

6. Notes and diagram details explaining methods of installation, restoration and/or removal of all permanent and temporary easements, access roads, bridges and any other facilities shall be included. Specific mitigation measures and designs of both a temporary and permanent nature to avoid environmental damage shall be included on a site specific basis where applicable; for example, details as to areas that are to be hydro-seeded, sodded, sodded and staked, rip-rapped, lined with Gabion baskets, etc. Items identifying requirements of landowners shall also be included, where applicable; for example, trench crossing access, fencing, vegetation protection, etc.

7. Location of snow-fencing to be placed along the boundaries of the temporary easement as well as around vegetation to be protected.

8. Notes and location, where possible, of existing recreation areas potentially to be affected by the construction activity.

9. Any other items referenced in these guidelines or that the company or their agent might feel are pertinent to the instruction of the contractor and success of the project.